Replacement Gas Furnace Check List

homeenergy+

Customer: _____ **Contractor:** _____
Telephone: _____ **Brand/Model #:** _____
Date Installed: _____ **Serial #:** _____
WisWap BID#: _____ ***or*** **WHEAP App#:** _____

Inspection/Adjustments

PMI=per manufacturer's instructions

(✔ box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable. Use comments box on P.2)

Fuel Type: ❒ Natural Gas ❒ Propane

Documents:
- ❒ Photos documenting furnace conditions and manufacturer nameplate were provided to Agency
- ❒ Installation information sticker (*installer name, phone number, date*)
- ❒ Warranty and manual in envelope attached to the furnace cabinet
- ❒ Agency given copy of sizing calculation Design temperature heat loss calculation:_____BTU/Hr

Electrical:
- ❒ Service disconnect is present and is operational
- ❒ Dedicated circuit and fuse or circuit breaker properly rated
- ❒ Set heat anticipator (thermostat) PMI ❒ Not applicable

Gas Piping: ❒ Sized for BTUs of all appliances ❒ No leaks ❒ Shut off present
❒ CSST bonded ❒ Sediment trap present

Air Filter: ❒ Filter opening covered/sealed ❒ Filter removes easily with no obstructions Size: x x

General:
- ❒ Furnace elevated off basement floor. *Note: If not in basement, can be on floor if okay per PMI.*
- ❒ Condensate properly drained per local code and PMI
- ❒ Combustion air and exhaust piping properly installed, terminated, and supported ❒ Test holes sealed
- ❒ Distribution plenums sealed; all major duct leaks properly sealed per specs
- ❒ Orphaned water heater has proper draft (see page 2 for acceptable draft results)

Installed and Measured BTU's of new furnace:

BTUs (high input):_____ Measured Input (2 cu. Ft of Gas): _____ Minutes: _____ Seconds: _____

BTUs (low input):_____ (if applicable) Measured Input (2 cu. Ft of Gas): _____ (if applicable) Minutes: _____ Seconds: _____

Measured Gas Pressure [Inches of water column (IWC)]:

Input (High): _____ Input(Low): _____ (If applicable) Manifold (High): _____ Manifold (Low):_____ (If applicable)

Performance Testing

(Enter test result. Indicate "N/A" if installation is space heater.)

Steady State Efficiency Test

Adjust to achieve Typical Ranges for Gas Burning Appliances (See page 2)

	SSE %	O_2 %	CO ppm	Intake Air °F	Flue °F	PMI AFUE %
High Input						
Low Input (If applicable)						

Distribution Static Pressure

Measured in supply plenum and blower cabinet

❒ IWC ❒ Pa

	Return Pressure	Supply Pressure	Total Pressure	
High Input				
Low Input (If applicable)				

Temperature Rise

	Supply °F	Return °F	(Supply - Return)	PMI Min	PMI Max
High Input					
Low Input (If applicable)					

Air Flow Rate Testing Results

	Heating CFM	*Fan Speed Setting*
High Input		
Low Input (If applicable)		

❒ Plate Method ❒ Fan Tables ❒ Other

List Other:

I certify that the visual inspection and the performance tests were completed as indicated.

Installer's Signature _____ Date _____

Name (Print legibly) _____

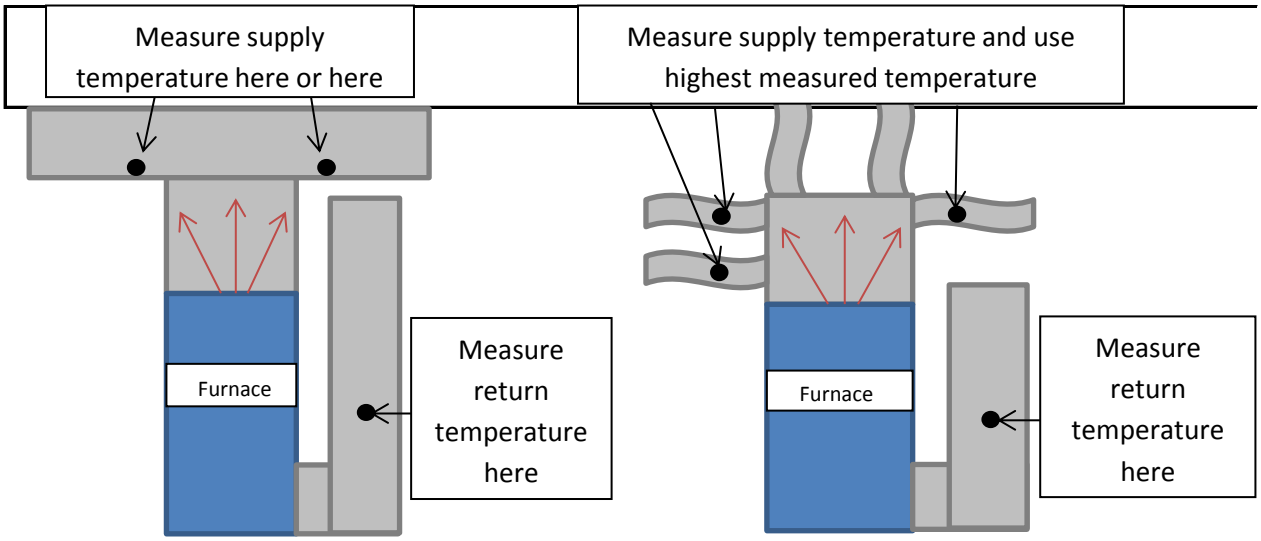
I certify that the heating system was installed to my satisfaction on the date indicated.

Customer's Signature _____ Date _____

Name (Print legibly) _____

Natural Gas and Propane Gas Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.
Examples of temperature rise testing procedures below



Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor Temperature			
°F	<10°	10°-90°	>90°
Pa.	-2.5	(°F_Out / 40) - 2.75	-0.5
IWC.	-.010	(°F_Out / 10,000) - 0.011	-.002

Table 3.2: Typical Ranges for Gas Burning Appliances		
Performance Indicator	**SSE 80+**	**SSE 95+**
Carbon monoxide (CO) ppm	≤ 100	≤ 100 or PMI
Stack temperature °F	325°- 450°	90°- 120°
Temperature Heat Rise °F	40° - 70°	45° - 70° or PMI
Oxygen (O_2) %	4 - 9%	4 - 9%
Natural gas pressure output at manifold - Inches of Water Column (IWC)	3.2 - 3.9 IWC	3.2 - 3.9 IWC
Propane pressure output at manifold (IWC)	10 - 11 IWC	10 - 11 IWC
Steady-state efficiency (SSE)	82 - 86%	95 - 97%
Supply temperature °F	120° - 140°	95° - 140°

Comments:

Replacement Oil Furnace Check List

homeenergy+

Customer: _____ **Contractor:** _____
Telephone: _____ **Brand/Model #:** _____
Date Installed: _____ **Serial #:** _____
WisWap BID#: _____ ***or*** **WHEAP App#:** _____

Inspection/Adjustments

PMI=per manufacturer's instructions

(✔ box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable. Use comments box on P.2)

Documents:
- ❒ Photos documenting furnace conditions and manufacturer nameplate were provided to Agency
- ❒ Installation information sticker (*installer name, phone number, date*)
- ❒ Warranty and manual in envelope attached to the furnace cabinet
- ❒ Agency given copy of sizing calculation Design temperature heat loss calculation:_____BTU/Hr

Electrical:
- ❒ Service disconnect is present and is operational
- ❒ Dedicated circuit and fuse or circuit breaker properly rated
- ❒ Set heat anticipator (thermostat) PMI ❒ Not applicable

Fuel Supply:
- ❒ New fuel filter ❒ Tank / lines comply with NFPA 31
- ❒ No leaks ❒ Purged fuel lines

Air Filter: ❒ Filter opening covered/sealed ❒ Filter removes easily with no obstructions Size: x x

General:
- ❒ Furnace elevated off basement floor.
- ❒ Acceptable clearances of heating unit and its vent connector to nearby combustibles per NFPA 31
- ❒ Chimney inspected for compliance with NFPA 211
- ❒ Barometric damper control operates properly
- ❒ Distribution plenums sealed; all major duct leaks properly sealed per specs
- ❒ Sealed test holes

Measured BTU's for new furnace:

BTUs (input):_____ Nozzle GPH:_____ Nozzle Angle:_____° Nozzle Spray Type:_____

Note: The oil nozzle information is required to be posted on the furnace with the date of installation

Measured Oil Pressure [Pounds Per Square Inch (PSI)]:

PMI _____ PSI Measured _____ PSI

Performance Testing

(Enter test result. Indicate "N/A" if installation is space heater.)

Draft Measurements

Flue Draft		(Before barometric damper 10-15 Pa or 0.04-0.06 IWC or PMI)
Overfire Draft		(Must be a minimum of 5 Pa. or 0.02 IWC or PMI)

Measured Smoke Number

Smoke Spot Scale # _____

Steady State Efficiency Test

Adjust to achieve Typical Ranges for Oil Burning Appliances (see page 2)

SSE %	O_2 %	Combustion CO ppm	Air °F	Flue °F	PMI AFUE %

Distribution Static Pressure

Measured in supply plenum and blower cabinet

❒ IWC ❒ Pa

Return Pressure	Supply Pressure	Total Pressure	

Temperature Rise

Supply °F	Return °F	(Supply - Return)	PMI Min	PMI Max

Air Flow Rate Testing Results

Heating CFM	Fan Speed Setting

❒ Plate Method ❒ Fan Tables ❒ Other

List Other:

I certify that the visual inspection and the performance tests were completed as indicated.

Installer's Signature _____ Date _____

Name (Print legibly) _____

I certify that the heating system was installed to my satisfaction on the date indicated.

Customer's Signature _____ Date _____

Name (Print legibly) _____

Fuel Oil Heating System Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.
Examples of temperature rise testing procedures below

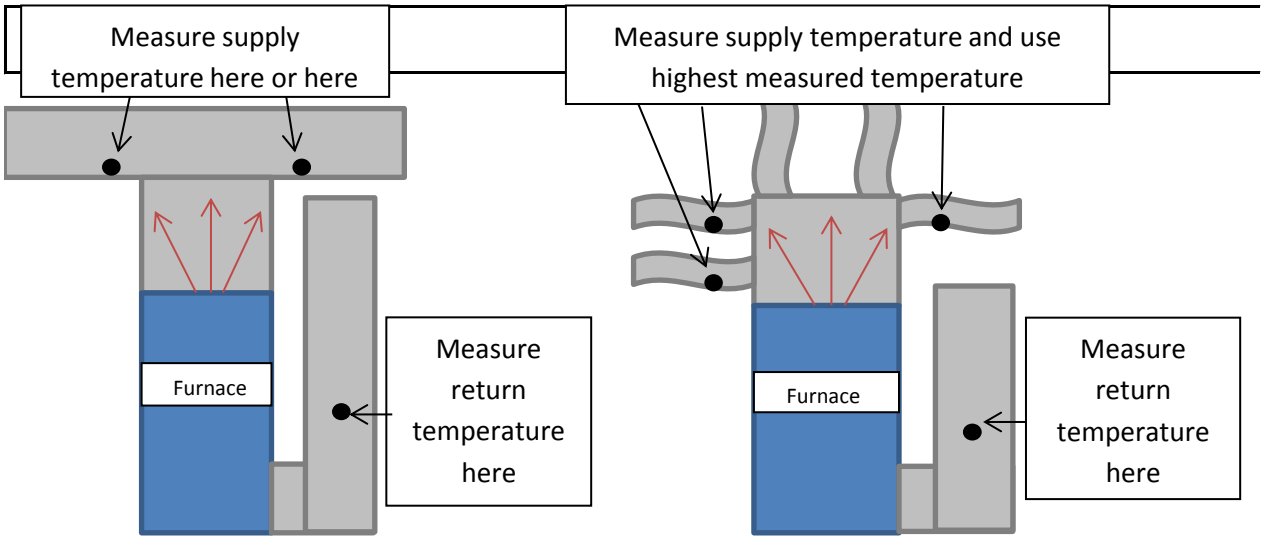


Table 3.5: Typical Ranges for Oil Burning Appliances

Performance Indicator	Flame Retention
Carbon monoxide (CO) ppm	≤ 100
Stack temperature °F	300°- 450°
Oxygen (O_2) %	5 - 9%
Smoke number (0-9)	< 1
Oil pressure pounds per square inch (psi)	100 - 150
Over-fire draft (Inches of Water Column)	-.02 IWC or -5 Pa
Flue draft (IWC)	-.04 to -.01 IWC or -10 to -15 Pa
Steady state efficiency (SSE)	≥ 80%

Comments:

Replacement Boiler Check List

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Customer: _____ **Contractor:** _____
Telephone: _____ **Brand/Model #:** _____
Date Installed: _____ **Serial #:** _____
WisWap BID#: _____ ***or*** **WHEAP App#:** _____

Inspection/Adjustments

PMI=per manufacturer's instructions

(✔ box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable. Use comments box on P.2)

Fuel Type: ❒ Natural Gas ❒ Propane ❒ Oil

Documents:
- ❒ Photos documenting boiler conditions and manufacturer nameplate were taken and provided to Agency
- ❒ Installation information sticker (*installer name, phone number, date*)
- ❒ Warranty and manual in envelope attached to the furnace cabinet
- ❒ Agency given copy of sizing calculation Design temperature heat loss calculation:_____ BTU/Hr

Electrical:
- ❒ Service disconnect is present and is operational
- ❒ Dedicated circuit and fuse or circuit breaker properly rated
- ❒ Set heat anticipator (thermostat) PMI ❒ Not applicable

Gas Piping:
- ❒ Sized for BTUs of all appliances ❒ No leaks ❒ Shut off present
- ❒ CSST bonded ❒ Sediment trap present

Fuel Oil: ❒ New Fuel Filter ❒ Tank/lines comply with NFPA 31 ❒ No leaks ❒ Purged Fuel Lines

General:
- ❒ Boiler elevated off basement floor. *Note: If not in basement, can be on floor if okay per PMI.*
- ❒ Check clearances of heating unit and its vent connector to nearby combustibles [Gas: IFGC; Oil: per NFPA 31]
- ❒ Installed Pressure Relief Valve: PMI
- ❒ Combustion air and exhaust piping properly installed, terminated, and supported ❒ Sealed test holes
- ❒ Barometric controls operate properly: PMI (if applicable)
- ❒ Bled air from the entire system
- ❒ Condensate properly drained per local code and PMI
- ❒ Orphaned water heater has proper draft (see page 2 for acceptable draft results)

Existing Load Terminals and Capacity:

Radiation Type: ❒ Fin Tube ❒ Radiator ❒ Baseboard ❒ Other: _____

Linear Feet:_____ (Fin Tube or Cast Iron Baseboard) Square Feet:_____ (Radiators)

Measured BTU's for new boiler:

Design Temperature Used _____ °F Modulating Boiler Turndown Ratio (if applicable) _____ : _____

BTUs (input):_____ Measured Input (2 cu. Ft of Gas): _____ Minutes: _____ Seconds: _____

Nozzle GPH:_____ Nozzle Angle:_____ ° Nozzle Spray Type:_____

Measured Gas Pressure [Inches of water column (IWC)] or Oil PSI:

Input: _____ Manifold (High): _____ Manifold (Low):_____ (if applicable) Oil:_____PSI

Installed Devices: Indicate what was installed. Steps must be taken to prevent condensation in non-condensing units.

❒ Air excluding device ❒ Mixing valves ❒ Automatic fill valve ❒ Backflow preventer ❒ Other:_____

❒ Wye Strainer ❒ Outdoor Sensor (install on North wall) ❒ Circulator Pump _____HP (Size) _____GPM (Speed Setting) _____W (Watts)

Performance Testing and Boiler Setup

Combustion and Draft Testing

Adjust to achieve Typical Ranges for Applicable Appliance (on page 2)

Select one ❒ CO_2 % ❒ O_2 %	CO ppm	Draft: ❒ IWC ❒ Pa	Intake Air °F	Flue °F	SSE %	PMI AFUE %
High Input (Test Results)						
Low Input (If applicable)						
High Input PMI (PMI Range)			Overfire Draft (if applicable)			
Low Input PMI (If applicable)			Smoke Test # (if applicable)			

Measured Temperatures

Outdoor °F	Primary Loop (High Input)	Supply °F	Return °F

Actual Boiler Setup

	Warm Weather Shut Down	Design Conditions
Outdoor Temp °F		
Boiler Supply Temp °F		

I certify that the visual inspection and the performance tests were completed as indicated.

Installer's Signature _____ Date _____

Name (Print legibly) _____

I certify that the heating system was installed to my satisfaction on the date indicated.

Customer's Signature _____ Date _____

Name (Print legibly) _____

Boiler Natural Gas, LP & Fuel Oil Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.

Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor Temperature			
°F	<10°	10°-90°	>90°
Pa.	-2.5	(°F_Out / 40) - 2.75	-0.5
IWC.	-.010	(°F_Out / 10,000) - 0.011	-.002

Gas: Measure draft halfway between collar and chimney.

Table 3.2: Typical Ranges for Gas Burning Appliances		
Performance Indicator	**SSE 80+**	**SSE 95+**
Carbon monoxide (CO) ppm	≤ 100	≤ 100 or PMI
Stack temperature °F	325°- 450°	90°- 120°
Oxygen (O_2%)	4 - 9%	4 - 9%
Natural gas pressure output at manifold - Inches of Water Column (IWC)	3.2 - 3.9	3.2 - 3.9
Propane pressure output at manifold (IWC)	10 - 11	10 - 11
Steady state efficiency (SSE)	82 - 84%	95 - 97%
Supply temperature °F	120° - 140°	95° - 180°
Return Water Temperature-Non-condensing °F	>120	NA

Table 3.5: Typical Ranges for Oil Burning Appliances	
Performance Indicator	**Flame Retention**
Carbon monoxide (CO) ppm	≤ 100
Stack temperature °F	300°- 450°
Oxygen (O_2)	5 - 9%
Smoke number (0-9)	< 1
Oil pressure pounds per square inch	100 - 150
Over-fire draft	-.02 IWC or -5 Pa
Flue draft	-.04 to -.01 IWC or -10 to -15 Pa
Steady state efficiency (SSE)	≥ 80%
Return Water Temperature-Non-condensing (°F)	>120

Oil: Measure draft between barometric damper and collar and at over fire.

Comments:

Heating System Repair or Clean and Tune Check List

Customer:_____ **Contractor:**_____

Telephone:_____ **Work Date(s):**_____

WHEAP/WX Agency:_____ **WisWap BID #:**_____

Fuel Type: ❑ Natural Gas ❑ LP/Propane ❑ Oil ❑ Other: _____ System Type: ❑ Forced Air ❑ Boiler ❑ Space Heater ❑ Other: ___

Input on label:_____ Output on label:_____ Measured Input (Clock meter):

Clean, inspect, test, and repair: Perform the following inspection procedures and maintenance practices on heating systems as necessary. The goal of these measures is to reduce carbon monoxide (CO), adjust fuel-air mixture, improve steady-state efficiency and verify the operation of safety controls. All holes that are drilled should be properly sealed after completion of testing.

All Systems

(✔ box, enter test results or requested number as item is inspected or completed. Indicate "N/A" if not applicable. Use comments box on P.2)

Emergency shut off	❑	Service disconnect is present and is operational
Electrical service.	❑	Inspect circuit. Rated for application. Note problems, make recommendations.
Fuel lines/storage tanks.	❑	No leaks present. Shut off present. Filter or sediment trap is present and clean.
Blower	❑	Clean.
Air Handler	❑	Clean.
Air Filter	❑	Clean or replace.
Heat exchanger	❑	Clean surface & inspect for leaks; inform customer & agency if exchanger is cracked.
Filter slot/filters	❑	Filter slot with cover is present. Replacement filters/ permanent filter present.
Thermostat	❑	Set heat anticipator to amperage measured in control circuit or PMI.

Oil Heating Unit

Oil filter	❑	Replace.
Nozzle	❑	Replace. Nozzle GPH_____ Nozzle Angle_____^{o} Spray Type_____
Electrodes	❑	Adjust gap and position in burner tube PMI.
Transformer	❑	Clean contacts. Measure voltage; replace if voltage is not within PMI.
Burner assembly and burner tube assembly	❑	Clean. Inspect for over burning. Replace flame retention head if damaged.
Combustion chamber	❑	Clean. If necessary, repair combustion chamber or replace.
CAD/Stack Control Cell	❑	Test. Verify that the burner shut off, PMI, when the cad cell is blocked from flame.
Flame Ignition	❑	Test. Ignition must be instantaneous; Pre-purge type unit, blower on prior to ignition.
Barometric Damper	❑	Plumb, level, swings freely.
Flue draft (before barometric damper)	❑	Measure and adjust as needed. (10-15pa or 0.04-0.06 IWC or PMI).
Over fire draft	❑	Measure and adjust as needed (5 Pa. or 0.02 IWC or PMI).
High limit control	❑	Measure shut off temperature adjust or replace if >250F^{0} (furnace), 180 F^{0}(boiler).
Oil Pump Pressure	❑	Measure, adjust to PMI.

NG or LP Heating Unit

Burners	❑	Check for dust, debris, misalignment, flame impingement, and other flame-interference problems. Clean, vacuum, and adjust as needed.
Burner/Manifold	❑	No soot, melted wire insulation, & rust in the burner & manifold area outside of firebox.
Pilot (if equipped)	❑	Burning, good ignition, check safety control for gas valve shut-off when pilot is out.
Gas Pressure (IWC)	❑	Input:_____ Manifold: _____

Test Results

Steady State Efficiency Test

Adjust to achieve combustion standards (Table 3-2 or 3-3).

SSE	O_2%	CO ppm	Smoke #	Flue F^{o}

Distribution Static Pressure

Measured in supply plenum and blower cabinet

Return Pressure	Supply Pressure	Air Flow Rate	Total Pressure	

Temperature Rise

PMI. If no instructions see specifications.

Supply °F	Return °F	Total Rise (Supply-Return)	PMI Range Min	PMI Range Max

I certify that the visual inspection, repair, maintenance, and the performance tests were completed as indicated.

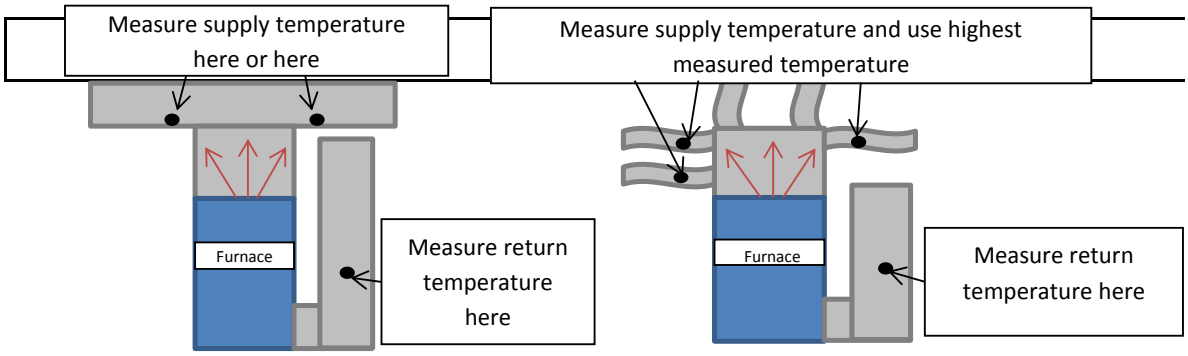
I certify that the heating system repair or maintenance work performed was to my satisfaction on the date indicated.

Installer's Signature _____ Date _____

Customer's Signature _____ Date _____

Natural Gas, LP & Fuel Oil Specifications

Generally accepted ranges, excerpted from the Weatherization Field Guide.
Note: Always follow manufacturer's instructions, if they differ from listed specifications.
Examples of temperature rise testing procedures below



Acceptable Draft Test Readings for Gas Appliances with Respect to Outdoor Temperature			
°F	<10°	10°-90°	>90°
Pa.	-2.5	(°F_Out / 40) - 2.75	-0.5
IWC.	-.010	(°F_Out / 10,000) - 0.011	-.002

Table 3.2: Typical Ranges for Gas Burning Appliances		
Performance Indicator	**SSE 80+**	**SSE 90+**
Carbon monoxide (CO) ppm	≤ 100	≤ 100
Stack temperature °F	325°- 450°	90°- 120°
Temperature Heat Rise °F	40° - 70°	30° - 70°
Oxygen (O_2) %	4 - 9%	4 - 9%
Natural gas pressure output at manifold - Inches of Water Column (IWC)	3.2 - 3.9	3.2 - 3.9
Propane pressure output at manifold (IWC)	10 - 11	10 - 11
Steady state efficiency (SSE)	82 - 86%	92 - 97%
Supply temperature (°F)	120° - 140°	95° - 140°

Table 3.5: Typical Ranges for Oil Burning Appliances	
Performance Indicator	**Flame Retention**
Carbon monoxide (CO) ppm	≤ 100
Stack temperature °F	300°- 450°
Oxygen (O_2) %	5 - 9%
Smoke number (0-9)	< 1
Oil pressure pounds per square inch (psi)	100 - 150
Over-fire draft	-.02 IWC or -5 Pa
Flue draft	-.04 to -.01 IWC or -10 to -15 Pa
Steady state efficiency (SSE)	≥ 80%

Comments: